

Ctenitis dianguiensis, a New Combination and the Recircumscription of *Ctenitis subglandulosa* (Pteridophyta, Dryopteriaceae)

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ABSTRACT. In preparation for the forthcoming *Flora of China*, volume 3, the new combination *Ctenitis dianguiensis* (W. M. Chu & H. G. Zhou) S. Y. Dong based on *Ataxipteris dianguiensis* W. M. Chu & H. G. Zhou (Pteridophyta, Dryopteriaceae) is proposed. In addition, seven scientific names synonymize to *C. subglandulosa* (Hance) Ching, of which three are new: *C. maolanensis* P. S. Wang, *C. membranifolia* Ching & Chu H. Wang, and *C. yunnanensis* Ching & Chu H. Wang.

Key words: *Ataxipteris*, China, *Ctenitis*, Dryopteriaceae, fern.

In preparation for a treatment of the fern genus *Ctenitis* (C. Christensen) C. Christensen for the forthcoming volume 3 of the *Flora of China*, a new combination, *C. dianguiensis* (W. M. Chu & H. G. Zhou) S. Y. Dong based on *Ataxipteris dianguiensis* W. M. Chu & H. G. Zhou (Pteridophyta, Dryopteriaceae), is made and *C. subglandulosa* (Hance) Ching is taxonomically recircumscribed.

Ataxipteris was established as a genus by Holttum (1984) based on a single species, *A. sinii* (Ching) Holttum, which was characterized by having frond form and venation similar to that seen in *Tectaria* Cavanilles and scales resembling those seen in *Ctenitis*. Six years later, Kramer (1990) merged *Ataxipteris* into *Ctenitis*. The genus *Ataxipteris* was known to and adopted by Chinese fern taxonomists in the early 1990s (Wang, 1992; Zhang, 1993), and an additional species, *A. dianguiensis* W. M. Chu & H. G. Zhou, was described from Guangxi and Yunnan (Zhou & Zhu, 1995). Considering the distinct scales and spore features shared by the two genera *Ataxipteris* and *Ctenitis*, I agree with merging them and thus propose the following new combination.

Ctenitis dianguiensis (W. M. Chu & H. G. Zhou) S. Y. Dong, comb. nov. Basionym: *Ataxipteris dianguiensis* W. M. Chu & H. G. Zhou, in S. Y. Dong & X. C. Zhang, *Acta Phytotax. Sin.* 42: 376. 2004. TYPE: China. Yunnan: Xichou, 27 Jan. 1985, W. M. Chu, H. G. Zhou & Z. L. Wu 18557 (lectotype, designated by Dong & Zhang, 2004: 376, PYU).

Ataxipteris dianguiensis W. M. Chu & H. G. Zhou was not published as a valid name in 1995 because its authors failed to designate a holotype but listed three syntypes. Dong and Zhang later validated the name in 2004 by selecting one of the three syntypes, W. M. Chu *et al.* 18557, as the lectotype. It should be pointed out that Funston (2001) had earlier selected a different syntype as type for *A. dianguiensis*. However, she erroneously noted this as a holotype and not explicitly as a lectotype (cf. Art. 9.21, McNeill *et al.*, 2006).

Distribution and habitat. *Ctenitis dianguiensis* is endemic to China (Guangxi, Hainan, and Yunnan), growing in forested limestone areas at altitudes between 800 and 1400 m (Zhou & Chu, 1995).

Discussion. *Ctenitis dianguiensis* is a distinctive species and closely related to *C. sinii* (Ching) Ohwi from southeastern China and southern Japan. The remarkable differences between them are the scales on stipe and rachis that are subulate and spreading in *C. dianguiensis* but lanceolate and appressed in *C. sinii*. The two species group together in the genus *Ctenitis* by having these correlated characters: the lamina is 2-pinnatifid, firm and chartaceous in texture, with some veinlets arising from the pinna-rachis; and the sori are exindusiate and the perispores are coarsely folded.

Selected specimens examined. CHINA. **Guangxi:** Napo, 850 m, H. G. Zhou 2606 (GAUA, PYU). **Hainan:** Changjiang, 900 m, S. Y. Dong 1062 (PE). **Yunnan:** Xichou, 1350 m, W. M. Chu *et al.* 21798 (GAUA, PYU).

Ctenitis subglandulosa (Hance) Ching, *Bull. Fan Mem. Inst. Biol., Bot.* 8: 302. 1938. Basionym: *Alsophila subglandulosa* Hance, *Ann. Sci. Nat., Bot., ser. V*, 5: 253. 1866. TYPE: China. Taiwan: 1864, *Oldham s.n.* (holotype, BM; isotype, K).

Ctenitis anyuanensis Ching & Chu H. Wang, *Acta Phytotax. Sin.* 19: 118. 1981. TYPE: China. Jiangxi: Anyuan, 1 June 1958, C. M. Hu 2253 (holotype, PE).

Ctenitis calcarea Ching & Chu H. Wang, *Acta Phytotax. Sin.* 19: 118. 1981. TYPE: China. Guizhou: Dushan, 22 June 1957, S. K. Wu *s.n.* (holotype, PE).

Ctenitis chungyiensis Ching & Chu H. Wang, Acta Phytotax. Sin. 19: 119. 1981. TYPE: China. Jiangxi: 23 June 1965, M. X. Nie 2022 (holotype, PE).

Ctenitis maolanensis P. S. Wang, Acta Bot. Yunnan. 9: 399, fig. 2. 1987. Syn. nov. TYPE: China. Guizhou: Libo, 19 May 1984, P. S. Wang et al. 76675 (holotype, HGAS; isotype, PYU).

Ctenitis membranifolia Ching & Chu H. Wang, Acta Phytotax. Sin. 19: 121. 1981. Syn. nov. TYPE: China. Yunnan: Pingbian, 26 Nov. 1954, K. M. Feng 5174 (holotype, PE).

Ctenitis rhodolepis (C. B. Clarke) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 300. 1938. Basionym: *Nephrodium rhodolepis* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 526, t. 72. 1880. TYPE: India. Darjeeling: Aug. 1875, Clarke 26934 (lectotype, designated by Holttum, 1985, K not seen).

Ctenitis yunnanensis Ching & Chu H. Wang, Acta Phytotax. Sin. 19: 124. 1981. Syn. nov. TYPE: China. Yunnan: 26 Mar. 1956, Yunnan Complex Exped. 5702 (holotype, PE; isotype, KUN).

Rhizome erect or suberect or prostrate; scales at apex of rhizomes linear, reddish brown, 1.5–3 mm; stipe 40–50 cm, dark stramineous; scales above base of stipes lanceolate or ovate-lanceolate, 2–3 mm, reddish brown, appressed; scales on rachis and pinna-rachis of similar shape and color but smaller. Lamina herbaceous, ovate to triangular, 40–60 × 30–40 cm, 3-pinnate to 4-pinnatifid, pinnae in 12 to 14 pairs; basal pinnae largest, triangular, 18–22 × 12–16 cm, pinnules in 10 to 12 pairs; basal basiscopic pinnules of basal pinnae the longest, 8–10 × 2.5–3.5 cm; base of upper pinnae or lobes not obviously decurrent, without veinlets arising from rachis; veins free, distinct, no veinlets arising from pinna-rachis. Sori medial or submedial or close to terminal costules; indusium absent or present, usually fugacious, hairless. Perispore coarsely echinate.

Distribution and habitat. *Ctenitis subglandulosa* is widespread in China (Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Hubei, Jiangxi, Sichuan, Taiwan, Yunnan, and Zhejiang) and also reported in Bhutan, Sikkim, India, Vietnam, Malaysia, the Philippines, and the Pacific Islands (Holttum, 1985; Wang, 1999). In China, it grows in limestone areas at an altitude of near sea level to 1700 m.

Discussion. *Ctenitis subglandulosa* is a widespread and morphologically variable species. Especially obscure is the indusium in this species. Most specimens that I examined were lacking indusia, but I found that a few indusia were present in one population from Guangxi. After further research on the development of indusia in cultivated plants, I discovered that the indusia are thin and colorless in very early stages but then abort or are only poorly developed. Thus, it is understandable that the indusium is not observable on most herbarium

materials, but in a few cases, the indusium is distinct and persistent (e.g., K. M. Feng 13197 [KUN, PE], from Yunnan, China; S. Mitsuta & H. Doei 396 [PYU], from Kyushu, Japan). Other highly variable characters include the size and abundance of the scales on stipes and rachis, the orange color and abundance of glands, and the abundance of hairs on the lamina. It was observed that the hairs on the abaxial laminar surface are present when the plants occur in open and dry areas (Dong, pers. obs.) but absent when the plants grow in shaded forest (Dong, pers. obs.). Mainly because of limitations of earlier understanding of the development of indusia in this species, several synonymous names were published.

It should be pointed out that the spore morphology is not always consistent in this species. For SEM study, I sampled spores from eight specimens: four representing the synonymous names *Ctenitis calcarea*, *C. chungyiensis*, *C. membranifolia*, and *C. yunnanensis*, and four samples representing *C. rhodolepis*. Two types of spore morphology were observed. One spore type is the perispore with \pm smooth folds, observed in *C. calcarea*, *C. membranifolia*, and two samples of *C. rhodolepis*; the second spore morphology has a perispore with coarse echinae, observed in *C. chungyiensis*, *C. yunnanensis*, and two samples of *C. rhodolepis*. A broader survey of spore morphology and development in this complex is clearly needed.

Selected specimens examined. CHINA. **Fujian:** Zhangzhou, P. X. Qiu 2808 (PE). **Guangdong:** Yingde, S. Wang 163439 (KUN). **Guangxi:** Baise, 950 m, W. M. Chu et al. 18345 (PYU). **Hainan:** Changjiang, 900 m, S. Y. Dong 1054, 1056 (PE). **Hubei:** Hefeng, 360 m, H. J. Li 8156 (PE). **Hunan:** S. W. Liu 30K (PE). **Sichuan:** Junlian, 1050 m, X. X. Kong 5208 (PE). **Zhejiang:** Yueqing, 130 m, X. P. Qiu & Y. P. Wu 6373 (PE).

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Literature Cited

- Dong, S. Y. & X. C. Zhang. 2004. Notes on the fern family Tectariaceae from Hainan Island, China. Acta Phytotax. Sin. 42: 375–379.
- Funston, A. M. 2001. Pteridophyte checklist for China. Missouri Botanical Garden, St. Louis.
- Holttum, R. E. 1984. Studies in the fern-genera allied to *Tectaria* III. *Aenigmopteris* and *Ataxipteris*, two new genera allied to *Tectaria* Cav., with comments on *Psomiocarpa* Presl. Blumea 30: 1–11.

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- . 1985. Studies in the fern-genera allied to *Tectaria* IV. The genus *Ctenitis* in Asia, Malesia and the Western Pacific. *Blumea* 31: 1–38.
- Kramer, K. U. 1990. Dryopteridaceae. Pp. 101–144 in K. Kubitzki (editor), *The Families and Genera of Vascular Plants, Vol. I. Pteridophytes and Gymnosperms*. Springer-Verlag, Berlin.
- McNeill, J., F. R. Barrie, H. M. Burdet, V. Demoulin, D. L. Hawksworth, K. Marhold, D. H. Nicolson, J. Prado, P. C. Silva, J. E. Skog, J. H. Wiersema & N. J. Turland (editors). 2006. *International Code of Botanical Nomenclature (Vienna Code)*. *Regnum Veg.* 146.
- Wang, C. H. 1999. Aspidiaceae. Pp. 1–105 in S. H. Wu (editor), *Flora Reipublicae Popularis Sinicae* 6(1). Science Press, Beijing.
- Wang, P. S. 1992. Pp. 131–132 in *Pteridophytes of Fanjing Mountain Nature Reserve*. Guizhou Science and Technology Publishing House, Guiyang.
- Zhang, C. F. 1993. Aspidiaceae. Pp. 282–288 in C. F. Zhang & S. Y. Zhang (editors), *Flora of Zhejiang, Vol. 1*. Zhejiang Science and Technology Publishing House, Hanzhou.
- Zhou, H. G. & W. M. Chu. 1995. Two new species of Aspidiaceae from Yunnan and Guangxi. *Acta Bot. Yunnan.* 17: 423–426.